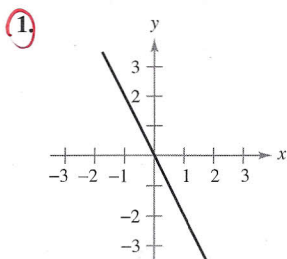
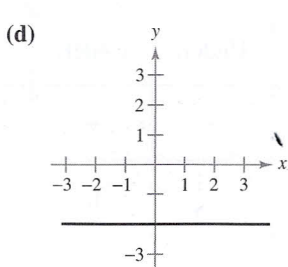
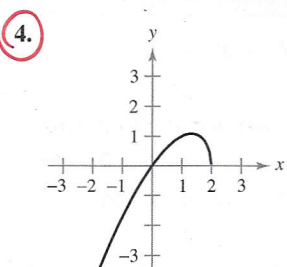
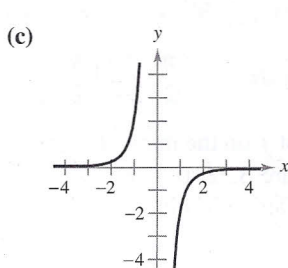
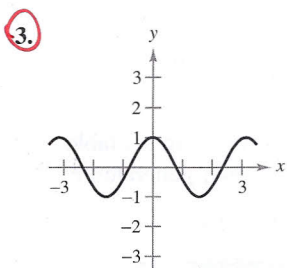
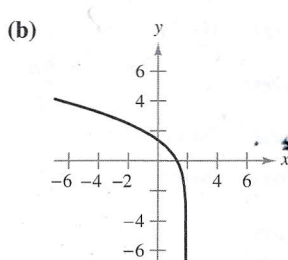
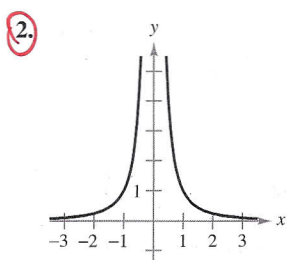
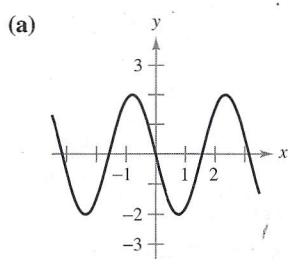


EXERCISES FOR SECTION 3.6

In Exercises 1–4, match the graph of f in the left column with that of its derivative in the right column.

Graph of f Graph of f' 

5. **Graphical Reasoning** The graph of f is given in the figure.
- For which values of x is $f'(x)$ zero? Positive? Negative?
 - For which values of x is $f''(x)$ zero? Positive? Negative?
 - On what interval is f' an increasing function?
 - For which value of x is $f'(x)$ minimum? For this value of x , how does the rate of change of f compare with the rate of change of f for other values of x ? Explain.

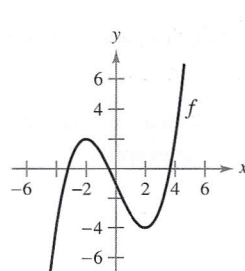


Figure for 5

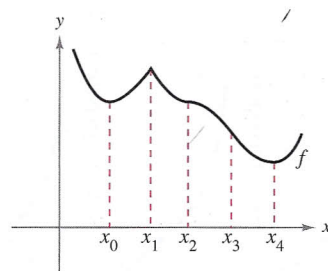


Figure for 6

6. **Graphical Reasoning** Identify the real numbers $x_0, x_1, x_2, x_3,$ and x_4 in the figure such that each of the following is true.
- $f'(x) = 0$
 - $f''(x) = 0$
 - $f'(x)$ does not exist.
 - f has a relative maximum.
 - f has a point of inflection.



In Exercises 7–38, analyze and sketch a graph of the function. Label any intercepts, relative extrema, points of inflection, and asymptotes. Use a graphing utility to verify your results.

7. $y = \frac{x^2}{x^2 + 3}$

8. $y = \frac{x}{x^2 + 1}$

9. $y = \frac{1}{x - 2} - 3$

10. $y = \frac{x^2 + 1}{x^2 - 9}$

11. $y = \frac{2x}{x^2 - 1}$

12. $f(x) = \frac{x + 2}{x}$

13. $g(x) = x + \frac{4}{x^2 + 1}$

14. $f(x) = x + \frac{32}{x^2}$

15. $f(x) = \frac{x^2 + 1}{x}$

16. $f(x) = \frac{x^3}{x^2 - 4}$

17. $y = \frac{x^2 - 6x + 12}{x - 4}$

18. $y = \frac{2x^2 - 5x + 5}{x - 2}$

19. $y = x\sqrt{4 - x}$

20. $g(x) = x\sqrt{9 - x}$

21. $h(x) = x\sqrt{9 - x^2}$

22. $y = x\sqrt{16 - x^2}$

23. $y = 3x^{2/3} - 2x$

24. $y = 3(x - 1)^{2/3} - (x - 1)^2$

25. $y = x^3 - 3x^2 + 3$

26. $y = -\frac{1}{3}(x^3 - 3x + 2)$

27. $y = 2 - x - x^3$

28. $f(x) = \frac{1}{3}(x - 1)^3 + 2$

29. $f(x) = 3x^3 - 9x + 1$

30. $f(x) = (x + 1)(x - 2)(x - 5)$

31. $y = 3x^4 + 4x^3$

32. $y = 3x^4 - 6x^2 + \frac{5}{3}$

33. $f(x) = x^4 - 4x^3 + 16x$

34. $f(x) = x^4 - 8x^3 + 18x^2 - 16x + 5$

35. $y = x^5 - 5x$

36. $y = (x + 1)^5$

37. $y = |2x - 3|$

38. $y = |x^2 - 6x + 5|$